DOCUMENT RESUME

ED 375 533 EC 303 198

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TITLE Visual-Motor Skills as a Predictor of Written Expression.
PUB DATE 17 Apr 93
NOTE 19p.; Paper presented at the Conference of the National Association of School Psychologists (Washington, DC, April 17, 1993). Contains small print of uneven quality.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; Elementary Education; *Expressive Language; Language Arts; *Learning Disabilities; Motor Development; *Perception Tests; *Perceptual Motor Coordination; Test Validity; Visual Perception; Writing (Composition); *Writing Skills
IDENTIFIERS *Developmental Test of Visual Motor Integration

ABSTRACT

This study investigated the relationship between the Developmental Test of Visual Motor Integration-Revised (VMI-R) and written expression skills of 54 students (grades 2 to 7) with learning disabilities. Data analysis compared cognitive ability; visual motor skills; achievement in reading, math, and written language; teacher rating of written language skills; and background information on each student. Results indicated that the VMI-R appeared to contribute significantly to understanding of written expression skills in this population. (Contains 14 references.) (DB)

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ED 375 533

VISUAL-MOTOR SKILLS AS A PREDICTOR OF WRITTEN EXPRESSION

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APRIL 17, 1993
WASHINGTON, D.C.

EC 303198

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ABSTRACT

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THE PURPOSE OF THIS STUDY IS TO INVESTIGATE THE RELATIONSHIP BETWEEN THE DEVELOPMENTAL TEST OF VISUAL-MOTOR INTEGRATION-REVISED (VMI-R) AND THE LEARNING DISABLED STUDENT'S WRITTEN EXPRESSSION SKILLS. SUBJECTS ARE 54 LEARNING DISABED STUDENTS, WHO WERE ENROLLED IN GRADES 2 TO 7. DATA ANALYSIS COMPARES COGNITIVE ABILITY, VISUAL-MOTOR SKILLS, ACHIEVEMENT IN READING, MATH, AND,WRITTEN LANGUAGE. TEACHER RATING OF WRITTEN LANGUAGE SKILLS, AND BACKGROUND INFORMATION ON EACH STUDENT.

THE STUDY IS DESIGNED TO ANSWER TWO QUESTIONS: HOW USEFUL IS THE DEVELOPMENTAL TEST OF VISUAL-MOTOR INTEGRATION-REVISED (VMI-R) IN UNDERSTANDING THE LEARNING DISABLED STUDENT'S WRITTEN LANGUAGE SKILLS? DOES INFORMATION FROM THE DEVELOPMENTAL TEST OF VISUAL-MOTOR INTEGRATION-REVISED (VMI-R) CONTRIBUTE MEANINGFULLY TO THE UNDERSTANDINGOF THE LEARNING DISABLED STUDENT'S WRITTEN LANGUAGE SKILLS?

THE RESULTS OF THIS STUDY INDICATE THAT THE DEVELOPMENTAL TEST OF VISUAL-MOTOR INTEGRATION-REVISED (VMI-R) DOES APPEAR TO CONTRIBUTE TO OUR UNDERSTANDING OF WRITTEN EXPRESSION SKILLS.

SUMMARY

The Developmental Test of Visual-Motor Integration (Beery, 1989) is widely used to evaluate visual-motor skills in children. Hutton, Dubes, and Muir (1992) found in their recent study of assessment practices of school psychologists that the Developmental Test of Visual-Motor Integration (Beery, 1989) was used by 20% of their sample as a measure of perceptual functioning.

The Developmental Test of Visual-Motor Integration (Beery, 1989) is composed of twenty-four geometric designs to be copied by the examinee using paper and pencil. One advantage of the test is that it provides a larger sample of behavior than other similar tests (Salvia & Yaseldyke, 1988). In addition, Salvia and Yaseldyke describe the Developmental Test of Visual-Motor Integration (Beery, 1989) as demonstrating stronger reliability and validity than other similar measures.

Despite this test's wide usage, little is known about the relationship between visual-motor skills and written expression. A review of the literature reveals that research has focused primarily on the relationship between visual-motor skills and reading, math, and spelling achievement. Fletcher and Satz (1982) used the Developmental Test of Visual-Motor Integration (Beery and Buktenica, 1967) as part of a kindergarten screening battery and found that the test predicted reading achievement in sixth grade. Two other studies (Hinshaw, Carte, and Morrison, 1986; Klein, 1978) found that visual-motor skills predicted reading, math, and spelling achievement for younger learning disabled children (aged 6 1/2 to 8 1/2 years of age). IQ appeared to be the best predictor of achievement for older students, aged 8 1/2 to 11 years of age (Hinshaw, Carte, and Morrison, 1986).

However, Wright and DeMers (1982) concluded that while visual-motor ability is related to achievement, it may not offer more information than any general ability measure. Duffy, Ritter, and Fedner (1976) reached a similar conclusion and found that the VMI

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accounted for a small amount of test variance when compared to an achievement measure.Much of the data demonstrating relationships between the VMI and achievement is correlational (Wright and DeMers, 1982).

The relationship between spelling and the Developmental Test of Visual-Motor Integration (Beery and Buktenica, 1967) has been investigated but has not been the primary relationship studied in the research. Curtis, Michael,and Michael (1979) measured the correlations between the spelling portion of the Comprehensive Test of Basic Skills (CTBS) , the Developmental Test of Visual-Motor Integration (Beery and Buktenica, 1967), and teacher ratings. They found a moderate correlation between spelling and VMI performance. This relationship was stronger than the correlation between visual-motor skills and teacher rating of students' fine motor skills.

The relationship between the Developmental Test of Visual-Motor Integration and cognitive ability has also been studied. The Developmental Test of Visual-Motor Integration (Beery and Buktenica, 1967) appears to be correlated with IQ, especially performance IQ (Breen, Carlson, and Lehman, 1985; Cullen,Boersma, and Chapman, 1981; Crofoot and Bennett, 1980) as measured by the Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974). Cullen, Boersma, and Chapman (1981)reported that a significant relationship exists between the Developmental Test of Visual-Motor Integration and the block design subtest of the Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974).

The present study examines the relationship between the Developmental Test of Visual-Motor Integration -Revised (Beery, 1989) and the learning disabled student's written expression skills, including areas like punctuation/capitalization, word usage, sentence structure, content, and length of work as well as spelling and handwriting. The study is designed to answer two questions. How useful is this test in understanding the learning disabled student's written language skills? Secondly, does information from the

Developmental Test of Visual-Motor Integration contribute meaningfully to the understanding of the learning disabled student's written language skills?

METHOD

SUBJECTS:

Subjects are 54 students classified as learning disabled in grades 2 through 7 from a single school district with an enrollment of approximately 1300 students. 80% of the students were male, and 20% were female. Most of the students received resource room services (67%) while 17% received consultant teacher services and 16% were partially mainstreamed. Data on parental marital status and socioeconomic status was collected . See Figure 1.

PROCEDURE:

All data was collected from psychoeducational evaluation results, which included initial as well as review evaluations. Data was collected by two district school psychologists.

As a part of the psychoeducational evaluation process, each student was administered the Wechsler Intelligence Scale for Children-Revised (WISC-R), and Developmental Test of Visual-Motor Integration. Norms from the Developmental Test of Visual-Motor Integration: Third Edition (Beery, 1989) were used. Achievement test scores were gathered in the area of reading, math, and written language skills. Background information was compiled on each student, which included age of student, grade, gender, race, parental educational level, parental occupation, and parental marital status.

The teacher rating scale used a five point Likert system. Teachers were asked to rate students' skill in these areas: handwriting, punctuation/capitalization, word usage, spelling, sentence structure, content/ideas expressed, length of written work, proof reading, motivation to write, and overall quality.

RESULTS

Correlation coefficients were calculated to determine the magnitude of the relationship between the VMI-R and the other variables. When the VMI-R was compared

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with the WISC-R subtests, correlations were surprisingly low. The correlation coefficient representing block design and the VMI-R was .14. Similarly, the coefficient representing the relationship between coding and the VMI-R was .20 (see Table 2). The correlation between performance IQ and the VMI-R was .14, which was also lower than expected. See Table 3 for more complete results.

The correlation between achievement and the VMI-R were also low. The strongest relationship existed between spelling and the VMI-R. The correlation coefficient for those two variables was .22. Please see Table 2 for more complete results.

Some stronger correlations were discovered when the VMI-R and teacher ratings were compared. The correlation coefficient for handwriting and the VMI-R was .28. The correlation coefficient for motivation to write and the VMI-R was .36,and the coefficient for overall quality and the VMI-R was .32. See Table 3 for more complete results.

Finally, a multiple regression analysis was performed, which compared achievement, intelligence test data, and the VMI-R with the teacher ratings from the written language checklist. While no significant relationships existed, three variables appeared to warrant further investigation. These variables were: handwriting, motivation to write, and overall quality. See Table 5 for more complete information.

DISCUSSION:

This study investigated the relationship between the VMI-R and written language skills in learning disabled students. The VMI-R is a widely used test, which does not appear to offer much interpretative data to the user. The results of this investigation seem to indicate that there may be a relationship between the VMI-R and several written language variables, which are handwriting, motivation to write, and overall quality. Further study of the relationship between the VMI-R and written language skills is necessary. It is suggested that future study employ an examination of students not classified as learning disabled in comparison to learning disabled students. Secondly, it would be helpful to measure actual writing skill through the use of a writing sample.

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FIGURE 1
SAMPLE CHARACTERISTICS:

SUBJECTS:

N=54
STUDENTS IDENTIFIED AS LEARNING DISABLED

GENDER: MALE 43 (80%) **FEMALE- 11 (20%)**

GRADE: GRADES 2 TO 7

PLACEMENT:

CONSULTANT TEACHER-	**9**	**(17%)**
RESOURCE ROOM-	**36**	**(67%)**
PARTIAL MAINSTREAM	**9**	**(16%)**

PARENTS' MARITAL STATUS:

MARRIED-	**35**	**(65%)**
SINGLE PARENT-	**10**	**(19%)**
REMARRIED-	**8**	**(15%)**
OTHER-	**1**	**(2%)**

SOCIOECONOMIC STATUS:

CLASS 1	**3**	**(6%)**
CLASS 2	**1**	**(2%)**
CLASS 3	**5**	**(9%)**
CLASS 4	**20**	**(37%)**
CLASS 5	**25**	**(46%)**

FIGURE 2

INSTRUMENTS:

I. DEVELOPMENTAL TEST OF VISUAL-MOTOR INTEGRATION (VMI)

II. WECHSLER INTELLIGENCE SCALE FOR CHILDREN-REVISED (WISC-R)

III. ACADEMIC SKILLS (MEAN=100, STANDARD DEVIATION=15)

- **READING**
- **MATH**
- **SPELLING**

IV. TEACHER RATING SCALE

Student_____ Date_____

Teacher_____

WRITTEN LANGUAGE CHECKLIST

Directions: *To assist in understanding the student's written language skills, please rate the student's skills compared with other students of his/her grade level. Circle One Choice : UJ-Unable to Judge, P-Poor, BA-Below Average, A-Average, AA-Above Average, and E-Excellent.*

SKILL	TEACHER RATING
HANDWRITING	UJ P BA A AA E
PUNCTUATION/CAPITALIZATION	UJ P BA A AA E
WORD USAGE	UJ P BA A AA E
SPELLING	UJ P BA A AA E
SENTENCE STRUCTURE	UJ P BA A AA E
CONTENT/IDEAS EXPRESSED	UJ P BA A AA E
LENGTH OF WRITTEN WORK	UJ P BA A AA E
PROOF READING	UJ P BA A AA E
MOTIVATION TO WRITE	UJ P BA A AA E
OVERALL QUALITY	UJ P BA A AA E

Scoring 1 2 3 4 5

Comments or Additional Observations_____

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TABLE 1
CORRELATIONS
OF WISC-R SUBTESTS
WITH THE VMI-R

	r	p
INFORMATION	-.09	.5039
SIMILARITIES	.13	.3218
ARITHMETIC	-.05	.6739
VOCABULARY	.09	.4915
COMPREHENSION	.17	.2139
DIGIT SPAN	.21	.1187
PICTURE COMPLETION	.04	.7650
PICTURE ARRANGEMENT	-.13	.3251
BLOCK DESIGN	.14	.2846
OBJECT ASSEMBLY	.17	.1978
CODING	.20	.1283

TABLE 2
CORRELATIONS OF THE VMI-R
WITH
ACHIEVEMENT,
INTELLIGENCE,
AND
SOCIOECONOMIC STATUS

	r
MATH	.09
READING	.19
SPELLING	.22
SOCIOECONOMIC STATUS	.19
VERBAL IQ	.04
PERFORMANCE IQ	.14
FULL SCALE IQ	.11

TABLE 3
CORRELATIONS OF THE VMI-R
WITH
WRITTEN LANGUAGE CHECKLIST

	r
HANDWRITING	.28
PUNCTUATION/ CAPITALIZATION	.15
WORD USAGE	.09
SPELLING	.13
SENTENCE STRUCTURE	.17
CONTENT/IDEAS EXPRESSED	.08
LENGTH OF WRITTEN WORK	.22
PROOF READING	.23
MOTIVATION TO WRITE	.36
OVERALL QUALITY	.32

TABLE 4
MEANS AND STANDARD DEVIATIONS
FOR
INDEPENDENT VARIABLES

VARIABLE	MEAN	STANDARD DEVIATION
MATH	96.582	10.386
READING	87.648	12.786
SPELLING	83.333	10.501
VMI-R	93.778	14.993
VERBAL IQ	94.000	9.761
PERFORMANCE IQ	101.352	10.653
FULL SCALE IQ	97.278	8.813

TABLE 5
REGRESSION ANALYSIS FOR
ACHIEVEMENT, INTELLIGENCE TEST, AND VMI-R
(INDEPENDENT VARIABLES)
WITH
WRITTEN LANGUAGE CHECKLIST SKILLS
(DEPENDENT VARIABLES)

SKILL AREA	ALL INDEPENDENT VARIABLES		UNIQUE VMI-R VARIANCE
	F(8, 45)	p	%
HANDWRITING	1.64	.14	12
PUNCTUATION/ CAPITALIZATION	2.48	.03	3
WORD USAGE	1.65	.14	1
SPELLING	3.27	.005	0
SENTENCE STRUCTURE	2.19	.05	2
CONTENT/IDEAS EXPRESSED	1.68	.13	0
LENGTH OF WRITTEN WORK	2.48	.03	4
PROOF READING	2.46	.03	2
MOTIVATION TO WRITE	1.71	.12	13
OVERALL QUALITY	3.97	.002	10

Another finding of this study relates to the relationship between the VMI-R and WISC-R. The VMI-R appears to measure a skill or ability that is not accounted for by the WISC-R. In this study, low correlations existed between the performance IQ and the VMI-R, as well as between the subtests block design and coding and the VMI-R. This finding is contrary to a study by Wright and DeMers (1982) and warrants further investigation.

FIGURE 3
CONCLUSIONS:

THE RESULTS OF THIS STUDY INDICATE:

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1. THE VMI-R APPEARS TO MEASURE A SKILL OR ABILITY THAT IS NOT ACCOUNTED FOR BY THE WISC-R. NOTE THE LOW CORRELATIONS BETWEEN SUBTESTS LIKE CODING AND BLOCK DESIGN AND THE VMI-R.

2.THE VMI-R APPEARS TO CONTRIBUTE INFORMATION TO OUR UNDERSTANDING OF HANDWRITING, MOTIVATION TO WRITE, AND OVERALL WRITING QUALITY.

3. FURTHER STUDY OF THE RELATIONSHIP BETWEEN THE VMI-R AND WRITTEN LANGUAGE SKILLS IS NECESSARY.

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